PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



MARK SCHEME

TOPIC 10: ECOSYSTEMS

THE NATURE OF ECOSYSTEMS

SCORE	PERCENTAGE
/36	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to two of the following: **One from similarities:** • neither found 34 to 35 m from high water line (1) • both found between 85 to 86 m and 116 m (1) **One from differences:** • marram grass found closer to high water line / elder is not found close to high water line / marram grass not found further inland / elder is found further inland (1) • range for marram grass is less than for elder / range for elder is greater than for marram grass / marram range is 80/81 m and elder range is 85 m (1) • maximum percentage cover of marram is greater than elder / marram maximum is 40% and elder maximum is 30% (1)	**DO NOT ACCEPT** description of data	**(2)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to the following: • use of {transect / tape measure / line} (1) • place {quadrats} at stated intervals (1) • method of how percentage cover measured (1)	**Eg:** number of squares occupied / point frame	**(3)**

Q2.

Question Number	Answer	Additional Guidance	Mark
(i)	• calculate the area of quadrat and calculate the area of grassland to calculate the number of quadrats in grassland (1) • multiply number of quadrats in area of grassland by number of clover (1) **Or** • number of clover plants per m^2 (1) • multiply by total area of grassland in m^2 (1)	<u>Example of calculation</u> $50 \times 50 = 2500\ cm^2$ / $0.25\ m^2$ and $90 \times 45 = 4050\ m^2$ $4050 \times 4 = 16200$ $16200 \times 9 = 145800$ $9 \times 4 = 36$ $36 \times (90 \times 45) = 145800$ Correct answer with no working gains full marks	**(2)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to three of the following: • use {several quadrats / larger quadrat} (1) • therefore larger area sampled (1) • place quadrats at random / use random number generation (1) • therefore achieve a consistent measure of the mean (1)	**Accept** use of running mean	**(3)**

Q3.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	An experimental method that makes reference to five of the following steps: • use of experts to identify and collect many samples of rhinoceros dung from all areas of the park (1) • DNA extracted from rhinoceros cells and amplified using PCR (1) • use of { restriction endonucleases / appropriate primers } to obtain short tandem repeat sequences from DNA (1) • use of gel electrophoresis to separate DNA fragments (1) • description of method used to visualise fragments (1) • each different pattern of bands represents one individual rhinoceros (1)	e.g. radioactive probe / fluorescent probe / Southern blotting / UV light / autoradiography / X- rays	

Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to the following: • no dung found from some rhinoceros, so they were not counted (1) • closely related individuals have similar DNA profiles, so they may not be distinguished as separate individuals (1)		**(2)**

Q4.

Question Number	Correct Answer	Additional guidance	Mark
(a)	See table below • differences in ranks of distance and diameter (1) • D^2 values correct (1)		**(2)**

Distance from low water mark / m	**Rank of distance**	**Mean diameter of limpets / mm**	**Rank of diameters**	**Difference in the two ranks (D)**	**D^2**
0	9	19.8	3	6	36
5	8	20.2	1	7	49
10	7	19.6	4	3	9
15	6	18.8	5	1	1
20	5	20.1	2	3	9
25	4	17.4	6	-2	4
30	3	16.1	**9**	**-6**	**36**
35	2	16.9	8	-6	36
40	1	17.2	**7**	**-6**	**36**
				ΣD^2 =	**216**

Question Number	Correct Answer	Additional guidance	Mark
(b)(i)	• $6 \Sigma D^2 = 1296$ (1) • $n (n^2-1) = 720$ (1) • Correct r_s value = -0.8(00) (1)	e.c.f. from (a) Correct answer (with minus sign) gains full marks Must be minus sign for marking point 3	**(3)**

Question Number	Correct Answer	Additional guidance	Mark
(b)(ii)	An answer that makes reference to the following: • there is a <u>significant negative</u> correlation between diameter of a limpet and height up the rocky shore (1) • because calculated value is greater than critical value (1) • at 5% significance level / 0.683 quoted (1)	Accept 2% or 1% critical value for m.ps 1 and 2 only Where no value is calculated in (b)(i) then accept marks in b(ii) for MP2 and 3 for theoretical explanation E.g. 'if value of r_s was greater than critical value (0.683) then there would be a significant correlation' would gain 2 marks	**(3)**

Question Number	Correct Answer	Additional guidance	Mark
(c)	An answer that makes reference to five of the following: • limpets kept in sea-water in tanks at the same {temperature / salinity} as they affect growth (1) • suitable number of {limpets in each tank / tanks containing limpets} to ensure reliability (1) • size of limpets in each tank selected to be within (narrow) range to start / or same distribution of sizes to ensure same potential for growth (1) • provision of food for limpets in equal amounts in each tank as food affects growth (1) • withdrawal of water from tanks for different periods of time (1) • size measured {mass / diameter / area of foot} because dependent variable must be quantitative to allow for statistical testing (1)		**(5)**

Q5.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to the following: • (interactions) of {organisms / biotic factors / communities / living} and {environment / abiotic factors / non-living factors} (1)	**IGNORE** habitat / area	**1**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to five of the following: • colonisation (of bare rock) by pioneer species / extremophiles / by organisms that withstand {low water / dry / low soil} (1) • (primary) succession occurs (1) • soil / humus produced (1) • therefore provides {water / minerals / nutrients / anchorage} for plants to grow (1) • provides niches / food / habitats for animals (1) • herbaceous plants / shrubs / trees become established / climax community emerging (1)	**ACCEPT** founder	**5**